Experiences of utilising ChatGPT for Teaching Economic and Management Sciences: A case study of second-year students at a University of Technology.

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Abstract

The use of technology in the classroom has become a vital element in meeting the demands of the 21st industrial revolution. This study presents second-year students teachers' experiences of utilising ChatGPT in the teaching and learning of Economic and Management Sciences. The study falls within an interpretive paradigm and adopted the qualitative case study. Open-ended questionnaire and semi-structured interview were used to generate data from 12 out of 56 second-year students at a University of Technology. Data were manually analysed through open coding. The findings show that second-year student teachers experienced both deep and surface learning as well as accommodation, assimilation, cumulative and transformative learning. The results of the study show that the students were not utilising ChatGPT for the purposes of teaching economic and management sciences. The findings also confirm that the students had no ChatGPT accounts, and they did not know how to utilise it for the teaching and learning processes. However, Google emerged as the commonest technological tool used to search for information for their assignments and not for teaching resources. The study recommends that universities need to infuse artificial intelligence tools in all module content to equip student teachers with AI knowledge necessary for integration in the classrooms. This paper calls for more comprehensive research into student teachers' experiences of utilising technological tools during the teaching and learning processes.

Key words: *ChatGPT, Student teachers, Learning experiences, Technology.*

1. Introduction

There is a growing concern about teachers' expertise in schools, and South Africa is not an exception. The South African Department of Education (DBE) expects all teachers to be long life learners who keep abreast with what is happening in the education systems, especially in their classrooms. Thus, this study explores the experiences of second-year students with regard to the utilisation of ChatGPT at a University of Technology in South Africa. The ChatGPT is a chatbot released in November 2022 by OpenAI, an artificial intelligence research company. It is used to generate information about a particular topic and to generate solutions to prompt questions.

The use of artificial intelligence in schools and universities has become a new trend for research purposes. In South African schools, teachers are required to implement various teaching methods which cater for inclusive education. Teachers need to understand how to use differentiated learning approaches since learners are unique participants in the knowledge acquisition process. Learners in schools and universities require differentiated learning so that there is sufficient monitoring of educational progress, providing continuous access to education, and developing the capacity to use digital assistants. On the other hand, using AI is beneficial for teachers, managing student populations, analysing and evaluating learning outcomes, and providing feedback (Osetskyi, Vitrenko, Tatomyr, Bilan, Hirnyk, 2020). The weaknesses of ChatGPT, which includes plagiarism and promoting disengagement from active learning, have been identified in several studies. However, when it is utilised effectively, ChatGPT yields excellent coaching and learning experiences. Research shows that when teachers and students utilise ChatGPT properly for academic research, they achieve their goals (Mlambo 2024; Sivasubramanian, 2021; Zhai, 2020). Rahman and Watanobe (2023) argue that teachers can take advantage of ChatGPT to search for course materials, ideas about a particular topic, get answers for assessment tasks, do presentations and lesson preparation. It can also help teachers to personalise student learning, generating clear questions or prompts for the lessons and tests. This paper addresses the principal research question: *What are second-year student teachers' experiences of utilising ChatGPT in the teaching and learning of Economic and Management Sciences?*

2. Literature review

Research shows that ChatGPT has exhibited top performance in many application domains, such as coherent content and essay generation, chatbot responses, language translation, question answering, and programming (Zhai, 20222; Osetskyi et al, 2020; Kim and Park, 2017).

Generally, literature on the use of artificial intelligence in South African schools and universities (Mlambo, 2024; Sevnarayan, 2024; Tarisayi, 2024) has been documented but the experiences on the utilisation of ChatGPT in the teaching and learning of EMS has not been adequately researched. Tanni (2008) assert that the new generation of student teachers might have used technological tools at a tender age, but few studies are available around their practice in searching and using online information.

Rahman and Watanobe (2023) focused on students and teachers' perspectives on the strengths, weaknesses and opportunities of using ChatGPT. This study showed that ChatGPT helps students to successfully improve their programming skills, generate program codes for numerical problems. Wardat, Tashtoush, AlAli and Jarrah (2023) explored students' and educators' perceptions of using ChatGPT in teaching mathematics and found that the bot generates answers to many mathematical problems. There are more studies about ChatGPT, but little has been researched in relation to EMS. It is, therefore, important to establish whether second-year teacher students have used ChatGPT in the teaching and learning of EMS.

3.   Theoretical framework

This study draws on Biggs' (2003) deep and surface learning and Illeris' (2009) types of learning theories. Illeris' (2009) theory offers guidance on how student teachers learn. This theory helps to unpack data and understanding of what and how they learn during their teaching practice. The types of learning include assimilation, cumulative or mechanical, accommodation and transformation.

Biggs' (2003) theory addresses and surface learning strategies. says deep learning occurs when one needs learning for the understanding of concepts or tasks at hand for future retrieval and application. Deep learning involves searching for meanings, focusing on the central argument or concepts needed to solve a problem, examining new facts and ideas critically, tying them into existing cognitive structures and making numerous links between ideas. Surface learning, on the other hand, occurs with the intention of meeting minimum requirements, without paying much attention to conceptual mastery (Biggs 2003). Surface learning is therefore quite close to rote learning and knowledge reproduction. It involves accepting facts and ideas uncritically, passively and storing them as isolated, unconnected items, focusing on solving a particular problem at that time.

Table 1: The principles of deep and surface learning strategy (Adapted from Biggs, 2003)

	Deep learning		Surface learning
	Knowledge transformation		**Information reproducing**
1.	Having an intention to understand material for oneself	1.	An intention simply to produce parts of the content
2.	Interacting vigorously with the content	2.	Ideas and information accepted passively
3.	Allowing students to make mistakes without penalty and rewarding effort	3.	Emphasising coverage at the expense of depth
4.	Relating new ideas to previous knowledge and experiences	4.	Limited time and high workload. Cynical view of education view; belief in recall of trivial facts
5.	Making use of evidence, inquiry and evaluation to reach informed conclusions	5.	Concentration on assessment requirements
6.	Confronting students' misconceptions and engaging students in active learning	6.	Having a short assessment cycle
7.	Examining the logic of arguments	7.	Memorising facts and procedures routinely
8.	Having time to pursue interests, through good time management	8.	Lack of interest in, and background knowledge of the subject matter
		9.	Not reflecting on purpose or strategies
		10	Failing to distinguish guiding principles or patterns

Illeris (2009) views the nature of learning through four types of learning: accommodative, assimilative, cumulative and transformative. According to Illeris (2009: 13), "accommodative learning implies that one breaks down (parts of) an existing scheme and transforms it so that the new situation can be linked in", while assimilative learning occurs by adding to the already existing knowledge. Transformative learning refers to learning that gives rise to changing frames of reference, of mind-set, of meaning perspectives or changing habits of the mind to make them more inclusive, discriminating, reflective, open, and emotionally able to change (Illeris 2009). This type of learning involves personality changes or changes in the organisation of self, characterised by the simultaneous restructuring of patterns and schemes in all three learning dimensions: content, environment, and incentives (Mukeredzi, Bertram and Christiansen, 2018). Cumulative or mechanical learning occurs when a scheme or mental pattern is established. It generally occurs in situations which require a learner to master something without context of meaning or personal significance (Illeris 2009), for instance a random cell phone number. Illeris points out that the learning is characterised by mechanical

protocols and is only recalled and applied during situations that are similar to the passive learning context.

4. Methodology

4.1 Research design

An interpretive case study research design was used with the aim of investigating a specific issue within its real-world context (Yin, 2018). A case study is often used by researchers to study a person or a group of people. According to Rule and Jon (2011), case study aims to understand an individual or group of people in-depth within their own context. Furthermore, Cohen, Manion and Morrison (2018) state that case study is conducted to understand the reality of participants' lived experiences about a particular situation. Thus, this study sought to understand the lived experiences of the second-year students teachers' experiences of utilising ChatGPT in the teaching and learning of EMS.

4.2 Sampling method

This study adopted purposive sampling design to select second-year EMS student teachers. There were 56 second-year EMS student teachers enrolled at DUT. Only 12 out of 56 students who were willing to participate in this study were selected. These second-year student teachers had been on teaching practice during their first year (2023) in the second semester. They were doing their teaching practice in schools that operate at different levels in terms of availability of resources. The sample consists of second-year student teachers e teaching EMS in senior phase (Grade 7-9) in 2023.

4.3 Research instrument and data collection processes

The data was generated during first semester in 2024 using open-ended questionnaire followed by semi-structured interviews. Author One distributed the questionnaire to all 56 second year students and thereafter conducted the individual interviews. The questionnaire was used first to understand whether all the second-year students were familiar with the ChatGPT tool. The in-depth open-ended questionnaire and semi-structured interviews enabled Author One to gain insight into second-year student teachers experiences regarding the use of ChatGPT. Creswell (2010) asserts that interviews involve probing for more in-depth understanding of a phenomenon instead of casual relationships. It also permits participants to explain their perceptions thereby enabling the researcher to elicit more detailed information. The interview

sessions lasted 30-35 minutes, and they were audio-recorded following the full consent of the research participants.

4.4 Data analysis

The data generated was analysed manually using open coding. Open coding is an interpretive process which researchers adopt to put raw data into small chunks, code, categorise and cluster it into themes. Glaser (2016) defines open coding as an essential methodological tool for qualitative data analysis that was introduced in grounded theory research. The data from both open-ended questionnaire and semi-structured interview were analysed through Biggs' (2003) deep and surface learning theory and Illeris' (2009) types of learning theory to understand the experiences of utilising ChatGPT during the teaching and learning of EMS and how student teachers learnt in their university. We discussed the data from the two instruments concurrently to avoid repetition. The findings show that student teachers in some cases experienced the tenets suggested by both Biggs and Illeris' theories.

The ethical clearance was granted by the University Ethics Committee in 2021 as part of scholarship of teaching and learning. The reference number was 271/21. Participants confirmed their willingness to participate before data generation by signing consent forms. Pseudonyms were used to maintain the confidentiality of the participants. The findings are presented in four themes in the next section.

5. Findings and discussion

This section is organised into four themes: experiences of utilising ChatGPT during teaching practice, experiences revolving around other artificial intelligence tools, experiences of utilising ChatGPT in relation to written assignments and experiences of shortage resources.

5.1 Experiences of utilising ChatGPT during teaching practice

Evidence from the open-ended questionnaire showed that 9 out of 12 student teachers did not utilise the ChatGPT tool during their teaching practice. One of these participants said: "*No, I am not familiar with ChatGPT, I know about it through this research*" ST1. The other participants also added: "*I have never employed ChatGPT in my practices, I just heard about it during this session.*" ST3. This was also evident when ST 4 says: "*I first heard about it last year during my teaching practice. I heard about ChatGPT from students from another*

university when they were doing their assignments, but I did not bother to look for information on it for my teaching."

Similarly, ST9 reported: *"Yes, I am a bit aware of ChatGPT but never used it before. I heard about it from a friend."*

These findings show that most participants had no experience of using ChatGPT during their teaching practice. Therefore, these results suggest that these student teachers were not exposed to ChatGPT and other artificial intelligence tools before they embarked on teaching practice. Lack of knowledge about various teaching tools might affect the teaching and learning processes in the classroom. Literature shows that ChatGPT has complicated both academic integrity concerns and the potential for enhanced learning in higher education (Winkler, & Söllner, 2018; Sullivan, Kelly, & McLaughlan, 2023). However, this was not the case with some of these participants in this study as they vowed that they had not used or known this tool before. Hence, these student teachers experienced Biggs' (2003) surface learning to teaching of EMS due to their lack of interest in researching the possibilities of generating contemporary teaching materials through ChatGPT. This implies that some of these students only accepted the ideas and information passively and did not take initiative for their own learning. Probably, these student teachers lack expertise in integrating technology into teaching and learning in their classrooms (Ruggiero, & Mong, 2015; Manyadze, 2021; Opara, Mfon-Ette Theresa, & Aduke, 2023).

In contrast to the above discussion, 3 out of 12 student teachers reported that they used ChatGPT during their teaching practice. Zhai (2022) argues that the use of artificial intelligence in education has the potential to enhance the effectiveness of teaching and learning in classrooms. This is evident from one of the participants who highlighted:

"I used ChatGPT to create interactive lessons by generating discussion prompts that allow learners to explore EMS in a new and engaging way" ST10.

"I have used it to conduct some research and to find suitable examples to use during EMS lessons. The generated examples made the learners understand the concepts easier." ST11

"As a teacher, I asked ChatGPT to spot weaknesses which are encountered during lesson delivery and areas that need more reinforcement in the classroom. This helped me to prepare for any pitfall and prevent gaps of learners' misunderstanding." ST12

"ChatGPT assisted me during my teaching practice by providing support in generating test questions and answers, as well as developing comprehensive rubrics for EMS projects. It also saved my valuable time and effort and gave me more time to focus on students' learning and less time on tests preparations…" ST11

These results illustrate that the students who were in better environment were able to utilise ChatGPT. This is in line with Biggs (1989) who argues that deep learning is represented by individual's commitment to understand material which is reflected in searching for suitable examples for the lessons, to check the anticipated pitfalls and ways of reinforcing concepts. It emerged that these student teachers also learn how to use ChatGPT to develop assessments. This was learning by assimilation or addition (Illeris, 2009) through ChatGPT.

5.2 Experiences revolving around other artificial intelligence tools

Artificial intelligence tools enable individuals to generate information in a shorter period of time. According to Sivasubramanian (2021, p. 65) artificial intelligence (AI) refers to "a branch of science and technology that creates intelligent machines and computer programs to perform various tasks which requires human intelligence." In other words, AI is a set of technological tools that allows a computer to perform various functions to understand, translate, analyse, and recommend ideas in line with the topic researched. It helps individuals to unpack complex tasks which includes reasoning, solving problems and making informed decisions. Hence, AI might promote both deep and surface learning (Biggs, 2003) depending on how the student teacher engages with the AI tools.

The following quotes illustrate the experiences of student teachers during their teaching practice on how they used the ChatGPT and other artificial intelligence tools.

"I used to google to research for additional information when I was preparing for my lessons." ST7

This finding confirms that the participant experienced Biggs' (2003) deep learning through accommodation (Illeris, 2009). The student teacher searched for more information to develop the lesson. Literature shows that practising teachers who use internet to search information are able to cope with the challenges of lesson planning as these resources complement textbooks with information retrieved from various information sources (Tanni, 2008).

"…besides the ChatGPT, I also used Google Bard and google to search for information for the topics in EMS like, types of business ownership, their advantages and disadvantages…" ST11.

From this finding, the student teacher experienced deed learning (Biggs 2003) as she interacted vigorously with different technological tools to search additional subject content for her learners. This is in line with Fitria and Suminah (2020) who assert that the advancements in technology have been accelerated, therefore information and knowledge are becoming transient and illusive. Therefore, initial teacher education training needs to be improved so that the student teachers become ready for the real AI-driven classroom environment.

Furthermore, the other participant mentions:

"I am familiar with ChatGPT as an AI language model, I have knowledge about various AI technologies, such as Zoom, Microsoft Teams, and Google meet. …I used to google and search for different definitions of EMS concepts so that the learners can have a variety of them besides the textbook ones." ST12

These findings indicate that the student teachers experienced deep learning (Biggs, 2003) in searching of more information about particular EMS definitions which might enhance teaching and learning in the classroom. This shows that the participants had an intention to understand teaching material for use in their classroom. These student teachers, therefore, experienced assimilative learning (Illeris, 2009) in regard to searching for more definitions of various EMS concepts than relying only on textbooks.

5.3 Experiences of utilising ChatGPT in relation to assignments

Assignments are tasks which student partake to fulfil the module requirements. List, Du and Wang (2019) view assignment as a piece of written work or task. It provides opportunity for university students to acquire knowledge, practice and demonstrate that they have achieved the learning outcomes. It offers evidence for the lecturers that the students have gained knowledge in a particular module topic. Writing of assignments is a process of completing the module syllabus before the final examination within a given timeframe.

"I didn't have the ChatGPT account before, I just created it because of the assignment requirements in this module. This is when I started to use it." ST1

This finding indicates that the participant only created the account due to the module requirements. Hence, ST11 experienced surface learning (Biggs, 2003) and cumulative learning (Illeris, 2009) in the utilisation of ChatGPT, as this could only be done to complete the task at hand without any motivation of using the technology for further learning.

"During my first year I was confused about a lot of things and ChatGPT was of great help. I used it for my assignments. It saved time for reading." ST10

"It has helped me with immediate access to an abundance of information that was required by my assignments as well as projects. It also helped me to quickly find answers to questions. It provided me with interactive and engaging learning experiences, helping to be motivated and interested in my studies and assignments." ST12

Biggs (1989) argues that deep professional learning is represented by personal commitment to understanding material which is reflected in combining different reading resources and reading widely. In addition, the findings show that the student teachers experienced transformative learning (Illeris, 2009) as they changed the way of thinking as they engaged with technology to help in studying and doing assignments. The use of ChatGPT and other artificial intelligence tools motivated the students who, in the process, became more interested in studying at their university.

5.4 Experiences of shortage of resources in terms of network connectivity and infrastructure

The imbalances which still exist in South African schools hamper the education systems. Research shows that shortage of classroom teaching resources demotivates teachers. Hence, teachers in rural schools end up not fulfilling their duties as shortage of resources in their schools might make them feel inferior. Rural schools in South Africa experience shortage of resources like electricity, poor internet connectivity, network infrastructures and computers (Aruleba & Jere, 2022). For instance, ST12 explained:

"I only used textbooks and hard copies (notes) which were available at the school where I did my teaching practice because there was no computers and internet connectivity was poor." ST2

"It was very difficult to use my laptop during the teaching practice, I was in rural area where electricity is a challenge." ST6

"There was a lot of load-shedding last year, I ended up not preparing lessons which needed to be projected or playing some YouTube videos. It restricted me to use other teaching methods like role-play, group work etc which do not need electronic gadgets." ST8

From this study, some of the second-year student teachers were teaching in rural areas where resources are scarce. The findings show that they experienced shortage of electricity, lack of computers and a lot of load shedding which caused them to have little access to technology. They had to do with whatever was available at school during their teaching practice.

6.0 Conclusion

The study sought to understand the experiences of second-year students teachers' experiences of utilising ChatGPT in the teaching and learning of EMS. The study found that most of the second-year students did not utilise ChatGPT during the teaching practice. It emerged that the student teachers experienced both deep and surface learning through accommodation, assimilation and cumulative learning. The findings confirm that the student teachers used google to search additional EMS teaching material. Furthermore, the student teachers experienced shortage of resources such as computers, poor network connectivity, load shedding and general AI-related infrastructure. Hence, these student teachers need to engage in collaborative learning to acquire deep professional learning through accommodation, assimilation which might lead them to transform their teaching and learning ways. We suggest that the student teachers must be exposed to various technological tools during the teacher training period before they embark on teaching practice. This is because the demands of the classroom in the 21st century call upon all teachers to be well-equipped with different teaching strategies which involve artificial intelligence too. We recommend for a more comprehensive study of second-year EMS student teachers' experiences in the utilisation of ChatGPT and other artificial intelligence to understand and inform the debates raised in this study.

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